

# Measurement of acetabular cup orientation after total hip arthroplasty in standing and sitting positions with a novel low dose biplanar slot scanner.

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No conflict of interest

# THE EOS System

EOS : 3D Modelisation of the lower limbs based on low-dose biplanar (A/P and lateral) radiographs.



# PURPOSE OF THE STUDY

- Improper positioning of the acetabular cup after total hip arthroplasty (THA) = recognized cause of dislocation.
- Cup orientation is commonly assessed with a CT scan in the supine position.
- A novel low dose biplanar slot scanner (SS) allows a 3D assessment of cup orientation in standing and sitting positions.  

Pelvis and total hip arthroplasty acetabular component orientations in sitting and standing positions: Measurements reproducibility with EOS imaging system versus conventional radiographies.

J.-Y. Lazennec, M.-A. Rousseau, A. Rangel, M. Gorin, C. Belicourt, A. Brusson, Y. Catonné. DOI: 10.1016/j.otsr.2011.02.006.
- The aim of the study was to evaluate the interest of using the SS to assess cup orientation after dislocation of THA.

# MATERIALS AND METHODS

33 THA patients, after an episode of dislocation of THA.

CT scan After reduction of the dislocation (Sensation 16, Siemens, Erlangen, Germany) in order to measure cup anteversion.

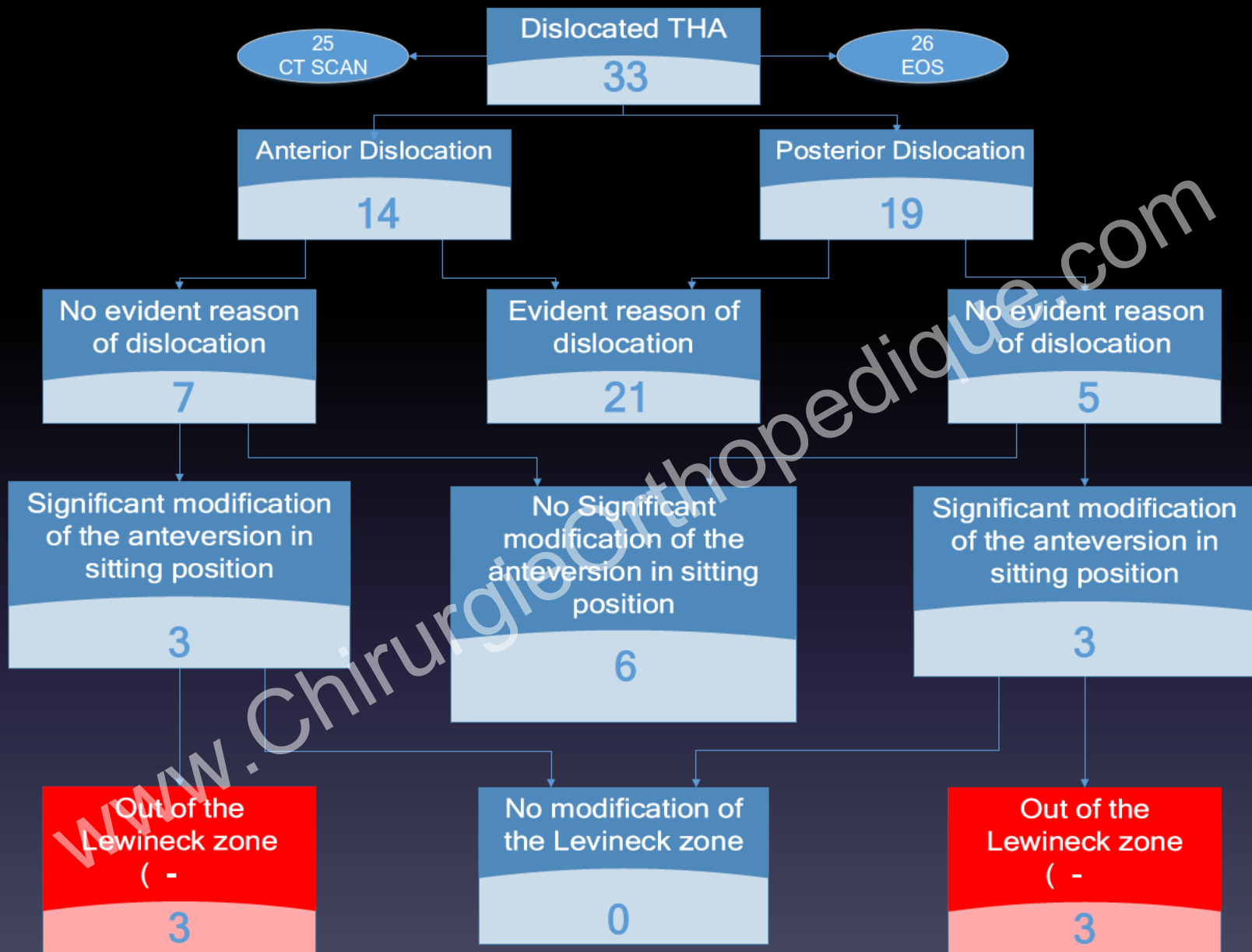
SS acquisitions (EOS system, EOS imaging, Paris, France) both in the standing and sitting positions → 3D modeling of the pelvises by 2 independent observers with a dedicated software → cup inclination and anteversion calculated.

# MATERIALS AND METHODS

- Variations of cup anteversion and inclination between the different positions were detected with the student t-test.
- The interobserver agreements of the SS evaluation of cup anteversion and cup inclination were assessed with the intraclass correlation coefficient (ICC).

# RESULTS

	Inclination		Anteversion	
	Bi-Plan System	CT	Bi-Plan System	CT
Intra-observer	0,99		0,98	
Inter-observer	0,99	0,65	0,99	0,96



# RESULTS

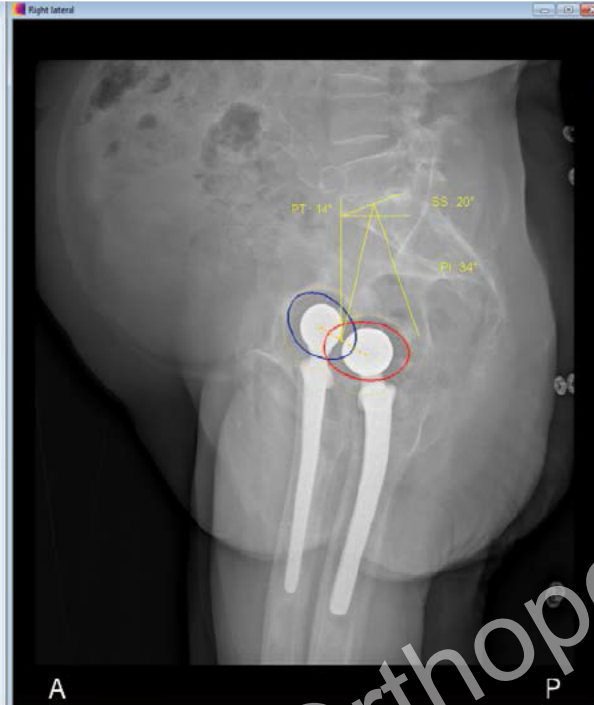
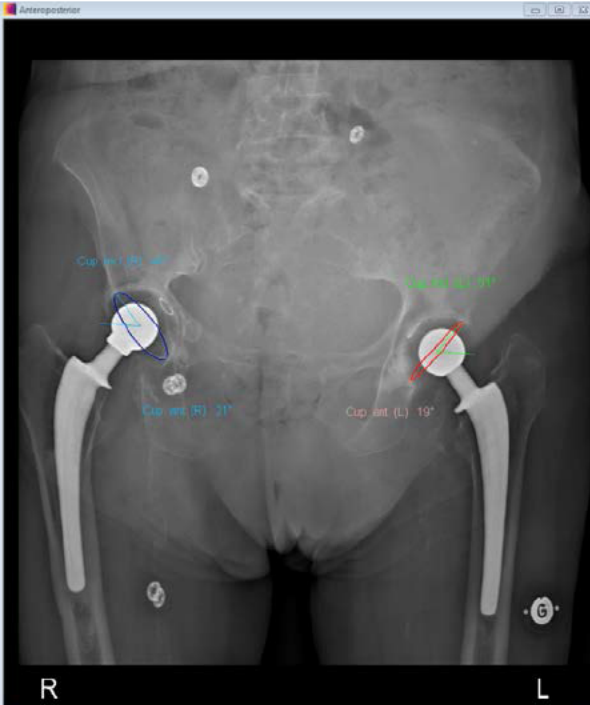
	Cup Anteversion CT	Cup Anteversion Standing	Security zone of Lewineck	Cup Anteversion Sitting	Security Zone of Lewineck	Standing- sitting Difference	Revision
Anterior dislocation							
	16,6	17,5	IN	39,0	OUT	-21,5	
		19,0	IN	33,5	OUT	-14,5	
Posterior dislocation							
Mrs D.	12,7	13,5	IN	46,5	OUT	-33,0	NO
Mr H.	20,6	20,5	IN	35,0	OUT	-14,5	NO
Mr L.	10,4	10,0	IN	38,0	OUT	-28,0	NO



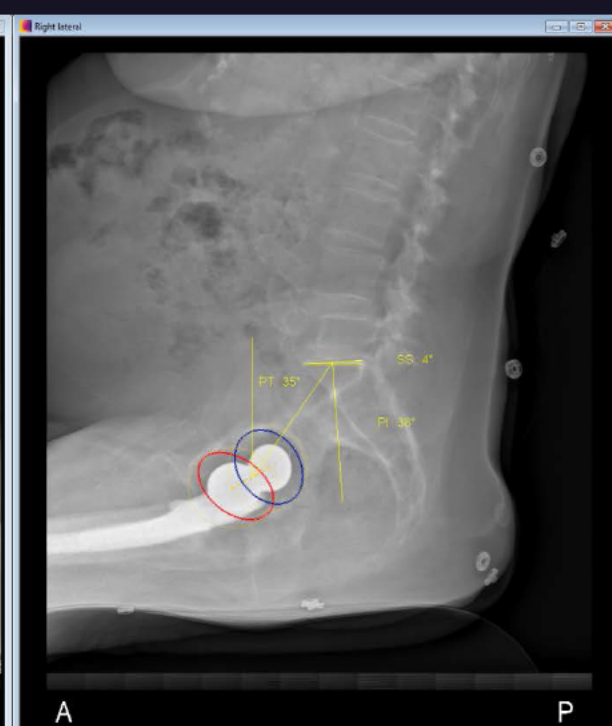
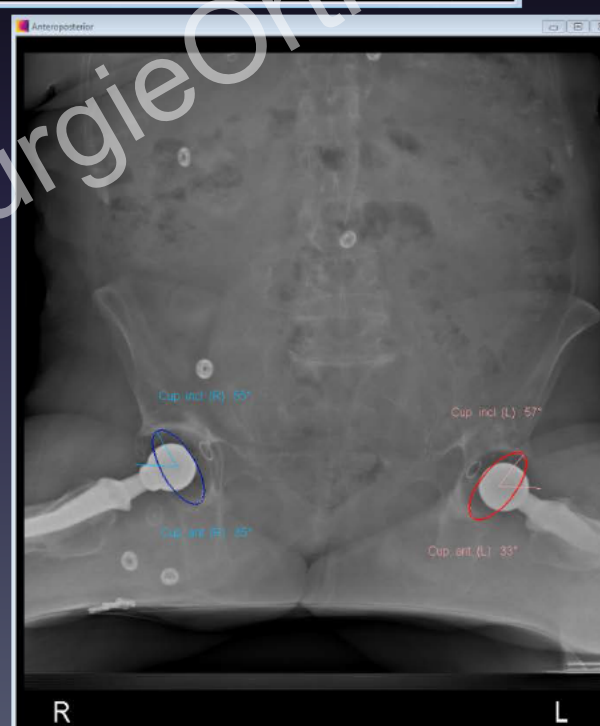
# Results:

Femoral Anteversion CT	17°
Cup Anteversion CT	16,6°
Cup Anteversion standing EOS	17,5°
Cup Anteversion sitting EOS	39,0°
Difference standing-sitting EOS	-21,5°
Security Zone of Lewinek	OUT





Standing EOS



Sitting EOS

Standing EOS

Sitting EOS

[www.ChirurgieOrthopedique.com](http://www.ChirurgieOrthopedique.com)

# DISCUSSION

Good inter and intra-observer reproducibility of EOS system in measuring the acetabular cup position.

Low patient irradiation:

EOS dose: 1.2 mGy.

CT scan dose: 17 to 31 mGy.

# DISCUSSION

## Limits:

- Only 25 out of 33 patients have had both the CT scan and the EOS imaging necessary for interpretation of the data.
- Determination of the type of dislocation (anterior Vs posterior ) was based on the patient's history and the physical exam before the reduction.
- Excessive anteversion does not explain the posterior dislocations.

# CONCLUSION

We managed to partially explain some unexplained dislocations after THA:

- 20% of all the dislocations that were hospitalized in our department.
- 50% of the dislocations with no evident cause.

EOS can replace CT scan in the investigation of non evident causes of dislocation in THA.

*Thank you*